

# **ATTACHMENT F**

California Environmental Protection Agency  
AIR RESOURCES BOARD

## **Supplement to Economic Impact and Emissions Assessment**

SUPPLEMENT TO ECONOMIC IMPACTS AND EMISSIONS ASSESSMENT OF THE  
INITIAL STATEMENT OF REASONS FOR THE PROPOSED AMENDMENTS TO ON-  
ROAD MOTORCYCLE EMISSION STANDARDS AND TEST PROCEDURES AND  
ADOPTION OF NEW ON-BOARD DIAGNOSTICS AND ZERO-EMISSION  
MOTORCYCLE REQUIREMENTS

The 15-Day changes resulted in impacts to the emissions projections and economic analysis for the Proposal as it was released in the Initial Statement of Reasons (ISOR) on November 28, 2023.<sup>1</sup> These changes and their impacts are summarized and discussed below.

**Change in Proposed Start Date for ICE ONMC Requirements**

Initially, staff had indicated to stakeholders that this item would be heard by the Board in January of 2024. Due to a delay in the Proposal going to the Board until November 2024, manufacturers expressed concerns that the uncertainty generated from the hearing delay would cause the loss of a year in their product development timelines. This would lead to difficulty in meeting the proposed ICE compliance dates by model year 2028. Therefore, Staff has altered the Proposal to push the start date back by one year to begin at 30% of new ICE ONMC sales for all ICE ONMC changes in the 2029 MY increasing to 60% in 2030 MY and 100% in the 2031 MY. The effect is to delay ICE related cost and emissions reductions by a year. It is difficult to determine the overall effect of this move by itself as several other changes occurred to the Proposal which are discussed here as well. Thus, the overall impact will be mentioned at the end of these changes.

**Change in ZEM Sales Baseline Projections**

ISOR ZEM baseline sales projections which impact the cost effectiveness estimates of the Proposal were based upon Staff analysis of trends in DMV data collected up through 2020. However, since posting the ISOR, Staff were able to obtain updated DMV data through 2022 that suggested Staff had slightly underestimated ZEM sales growth. However, staff were also able to obtain ZEM sales data for 2023 from individual ZEM manufacturers and the Motorcycle Industry Council (MIC) that showed large declines in California ZEM sales. Staff believes this may have been due to broad economic factors and declines in both State and Federal subsidies for ZEMs that year. Although Staff believes that the overall growth trend predicted for future ZEM sales is still appropriate, staff has adjusted the baseline to reflect the new data from MIC. This results in significant changes in ZEM baseline population out to 2050 and a decline of approximately 8,000 ZEMs. This will impact the number of ZEMs that must be produced in order to generate ZEM credits required by the program, and thus increase the compliance costs of manufacturers by forcing them to build more ZEMs earlier in the program than Staff had anticipated. This was a significant reason for staff to alter the formulas and credits obligations discussed below.

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<sup>1</sup> CARB. (2023). Public Hearing to Consider the Proposed Amendments to On-Road Motorcycle Emission Standards and Test Procedures and Adoption of New On-Board Diagnostics and Zero-Emission Motorcycle Requirements Staff Report: Initial Statement of Reasons, November, 2023 (web link: <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/onmc/isor.pdf>).

## **Change in ZEM Credit Formulas and Obligations**

ZEM credit formulas and multipliers were included in the original proposal to both incentivize early and larger ZEM (Tiers II and III) sales. ZEM credit obligations are to help ensure that nominal sales requirements would in fact be representative of actual real-world sales. Early ZEM sales and corresponding accumulation of credits will help to smooth compliance requirements. Larger ZEMs with higher ranges and fast charging are more challenging and costly to build, requiring more incentives early on for manufacturers than building small Tier I ZEMs that do not require the long range or fast charging capabilities. Current credit formulas are given above under ZEM Requirements. However, due to recent changes in ZEM baseline sales projections as discussed above, staff found it appropriate to change the credit formulations to compensate in the early years of the program for the lower than expected baseline sales of ZEMs. The specific changes made to credit formulas were to extend the early adoption credit multiplier periods for ZEMs, increase early adoption multipliers for Tier II ZEMs, and increase fast charge credits for Tier II ZEMs. The first stage of early adoption multipliers were extended for two years to end with MY 2029. Similarly, staff pushed back the second credit multiplier period for two years to begin in MY 2030 and additionally adding a year such that this period would end in MY 2033. This change results in the third multiplier period pushed back three years to begin MY 2034 with it ending, as previously proposed, in MY 2035. For Tier II ZEMs, multipliers were increased from 3 to 4 in the first early adoption multiplier period ending in MY 2029 and then increased from 1.5 to 2 in the next early adoption multiplier period ending in MY 2033. Fast charge credits were also increased from 0.25 to 0.5 for Tier II ZEMs. Note, it is difficult to determine the overall effect of these moves by themselves as several other changes occurred to the Proposal which are discussed here as well. Thus, the overall impact will be mentioned at the end of these changes.

## **Changes to REMI Modeling and Other Inputs**

Regional Economic Models, Inc. (REMI) Policy Insight Plus Version 3.2.0 is used to estimate the macroeconomic impacts of the Proposal on the California economy. REMI is a structural economic forecasting and policy analysis model that integrates input-output, computable general equilibrium, econometric and economic geography methodologies.<sup>2</sup> REMI Policy Insight Plus provides year-by-year estimates of the total impacts of the Proposal, pursuant to the requirements of Senate Bill 617 (Stats. 2011, ch. 496) and the California Department of Finance.<sup>3,4</sup> Staff used the REMI single region, 160 sector model with the model reference case adjusted to reflect California Department of Finance's most current publicly available economic and demographic projections.

Specifically, the REMI model's National and Regional Control was updated to conform to the most recent California Department of Finance economic forecasts which include U.S. Real Gross Domestic Product, income, and employment, as well as California civilian employment by

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<sup>2</sup> For further information and model documentation see: <https://www.remi.com/model/pi/>.

<sup>3</sup> California Legislature, Senate Bill 617. October 2011.

<sup>4</sup> California Department of Finance, Chapter 1: Standardized Regulatory Impact Analysis for Major Regulations - Order of Adoption. December 2013.

industry, released with the 2024 May Revision to the Governor’s Budget and Department of Finance demographic forecasts for California population forecasts, last updated in March 2024.<sup>5,6,7,8</sup> Where the Department of Finance economic forecasts end in 2027, CARB staff made assumptions that economic variables would revert back to trends found in the REMI baseline forecasts.

Staff has updated other inputs, including the sales tax rates, utility users tax, gasoline tax, and fuel cost projections.<sup>9,10,11,12,13</sup> The updated average state and local sales tax rates are 8.8% and 4.86% respectively. The updated average utility users tax is 3.46%, and the updated state excise tax for gasoline is 59.6 cents per gallon. Staff uses the latest price projections for gasoline and electricity from the California Energy Commission.

### Summary of Impacts of Above Changes

These changes have led to a change in the population of ZEM and improved ICE ONMC sales over baseline as shown in Table 1.<sup>14,15</sup>

**Table 1. Cumulative Change in Projected Total Unit Sales Through 2045.**

	Projected Minimum ZEM Sales Required Over Baseline (units)	Total ICE ONMC Sales (units)
Current Proposal	286,674	1,041,385
Original Proposal	218,554	1,036,608

<sup>5</sup> California Department of Finance. Economic Research Unit. National Economic Forecast – Annual & Quarterly. Sacramento: California. May 2024.

<sup>6</sup> California Department of Finance. Economic Research Unit. California Economic Forecast – Annual & Quarterly. Sacramento: California. May 2024.

<sup>7</sup> California Department of Finance. Economic Research Unit. National Deflators: Calendar Year averages. Sacramento: California. May 2024.

<sup>8</sup> California Department of Finance. Demographic Research Unit. Report P-3: Population Projections, California, 2020-2060 (Baseline 2019 Population Projections; Vintage 2023 Release). Sacramento: California. March 2024.

<sup>9</sup> CARB, 2024 State and Local Sales Tax Spreadsheet.

<sup>10</sup> CARB, 2024 Population Weighted Average Utility Users Tax Spreadsheet.

<sup>11</sup> Legislative Analyst’s Office. 2023. Frequently Asked Questions – Transportation Taxes and Fees. Last updated: October 2023. <https://lao.ca.gov/Transportation/FAQs>.

<sup>12</sup> California Department of Tax and Fee Administration, 2024. Sales Tax Rates for Fuels. <https://www.cdfta.ca.gov/taxes-and-fees/sales-tax-rates-for-fuels.htm>. Accessed 7/1/2024.

<sup>13</sup> California Department of Tax and Fee Administration, 2024 Energy Resources (Electrical Energy Surcharge Rate). December 2023.

<sup>14</sup> CARB, Economic Analysis Spreadsheet to Support the Proposed Amendments to On-Road Motorcycle Emissions Standards, September 17, 2024.

<sup>15</sup> CARB, Appendix C Economic Analysis, Proposed Amendments to On-Road Motorcycle Emission Standards and Test Procedures and Adoption of New On-Board Diagnostics and Zero-Emission Motorcycle Requirements Economic Analysis November 28, 2023 <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/onmc/appc.pdf>

These changes in sales population of ONMCs impacted by the proposal lead to the emissions changes shown in Table 2. The reason NOx and CO have fewer reductions under the current Proposal relative to the original Proposal is that the increased reductions due to increased ZEM sales are offset due to the exhaust requirements being pushed from MY 2028 to 2029.<sup>16,17,18</sup>

**Table 2. Cumulative Change in Projected Emissions Reductions Through 2045.**

	NOx (tons)	ROG Exhaust (tons)	ROG Evap (tons)	CO (tons)	PM2.5 (tons)	GHG (MMT)
Current Proposal	4,617	8,994	7,812	126,480	33	0.64
Original Proposal	4,805	9,121	7,416	132,351	28	0.58
Difference	-188	-127	396	-5,871	5	0.06

This leads to an overall cost effectiveness change as shown in Table 3. This results in a less than 1% decrease in the efficiency of the proposal.<sup>19</sup>

**Table 3. Change in Cost Effectiveness of Proposal as Measured Through 2045.**

	Combined Direct Cost and Savings (\$)	Total Weighted Emissions Reduced (tons)	Cost Per Ton Reduced (\$)
Current Proposal	\$280,682,264	22,075	\$12,715
Original Proposal	\$276,375,810	21,909	\$12,615
Difference	\$4,306,454	166	\$100

## Summary of Changes to the Alternatives Considered

Two alternatives were considered in the original ISOR. These were both impacted by the ZEM baseline sales projections which were assessed in the proposal. This section shows the summary of those impacts.

Alternative 1 considered keeping the same requirements for ICE ONMCs as those in the Proposal while eliminating the ZEM sales requirements of the proposal. This alternative would simply bring ICE ONMCs in line with the most aggressive standards in the world (Euro 5) while taking no action to promote ZEM adoption. This alternative results in lower upfront costs due in large part to the benefits of harmonizing with existing Euro 5 exhaust emissions standards but

<sup>16</sup> CARB, Emissions Inventory Derivations Spreadsheet to Support the Proposed Amendments to On-Road Motorcycle Emissions Standards, September 17, 2024.

<sup>17</sup> CARB, Emissions Inventory Derivations Spreadsheet for Alternative 1 to Support the Proposed Amendments to On-Road Motorcycle Emissions Standards, September 17, 2024.

<sup>18</sup> CARB, Emissions Inventory Derivations Spreadsheet for Alternative 2 to Support the Proposed Amendments to On-Road Motorcycle Emissions Standards, September 17, 2024.

<sup>19</sup> Ibid. CARB Economic Analysis Spreadsheet.

does not experience the same offsetting operational savings of the Proposal over the long run due to displacing gasoline usage with electricity. Further this alternative does not reduce emissions as significantly as the Proposal.

Alternative 2 aggressively pushes ZEM sales according to the schedule of Table 4 while doing nothing to improve current ICE ONMCs emissions standards. While this alternative would cost more up front, it would achieve greater emissions reductions and cost savings in the long term due mainly to displacing gasoline with electricity as a fuel. However, by eliminating ICE ONMC sales, this may also place some usage constraints on users as well.

**Table 4. Alternative 2 ZEMs Sales Requirement.**

CY	ZEM Sales Requirement
2028	10%
2029	20%
2030	30%
2031	40%
2032	55%
2033	70%
2034	85%
2035	100%
2036+	100%

The comparison of revised emissions estimates between the Proposal and the Alternatives is given in Table 5.

**Table 5. Total Statewide Emissions Reductions Comparisons through 2045.**

Scenario	NOx (tons)	ROG Exhaust (tons)	ROG Evaporative (tons)	CO (tons)	PM2.5 (tons)	GHG (MMT)
Proposal	4,617	8,994	7,812	126,480	33	0.6
Alternative 1	3,997	7,203	4,813	116,392	0	0
Alternative 2	5,449	11,731	13,143	130,037	92	2.19

The comparison of revised cost effectiveness estimates between the Proposal and the Alternatives is given in Table 6.

**Table 6. Summary of Costs and Benefits of Proposal and Alternatives (2020\$Millions).\***

Scenario	Costs	Benefits	Net Cost
Proposal	\$605	\$974	\$281
Alternative 1	\$449	\$531	\$445
Alternative 2	\$1,085	\$1,817	\$166

\* Note that Benefits include the monetization of health benefits while Net Costs do not.

A discussion of the reasons for rejecting Alternatives 1 and 2 can be found in the ISOR and have not changed with this adjustment in analysis.<sup>20</sup>

### **Changes in Proposal that Do Not Impact Costs or Emissions**

There were a series of changes made that were meant to add clarity to test procedures and compliance language that will have no expected impact on the costs of the Proposal. For more details on these changes, see the 15-day changes. These changes include clarifying language around ZEMs and OBD, clarifying requirements on the in-use monitor performance ratio (IUMPR) and applicability to EU requirements, and clarifications of evaporative test procedure details.

### **Errata**

On Page 1 and 8 of the Initial Statement of Reasons (ISOR) and Page 1 of Appendix C (Economic Analysis) to the ISOR, the following was stated:

*“While ZEMs do still have upstream emissions that are associated with the production of the electricity or other fuel used to power them (and are accounted for in the analysis of this Proposal), ...”*

This statement is in error as upstream emissions were not accounted for in the economic analysis for this Proposal. This error likely made its way into early drafts before analysis was complete. This error does not change the findings within the economic analysis as an upstream analysis would mainly be concerned with the impacts of greenhouse gases (GHGs). Any GHG reduction co-benefits mentioned due to ZEM requirements were not used in the calculations of the cost benefit analysis. Emissions reductions considered in the cost benefit analysis included ROG, NOx and PM.

Also note, this proposal is not technology prescriptive, although it is very likely that battery electric motorcycles will be used to meet the gradually increasing requirements of ZEM sales up to 50% by 2035. The authority of the rule making is granted under Sections 39600, 39601, 39602.5, 43013, 43018, 43100, 43101, 43104, 43105, 43106 and 43107, Health and Safety Code, which requires CARB to adopt rules to reduce criteria air pollutants to meet national ambient air quality standards. ZEMs do this effectively in areas where people live and work by eliminating tailpipe emissions such as ROG, NOx and PM.

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<sup>20</sup> Ibid., CARB Appendix C Economic Analysis.